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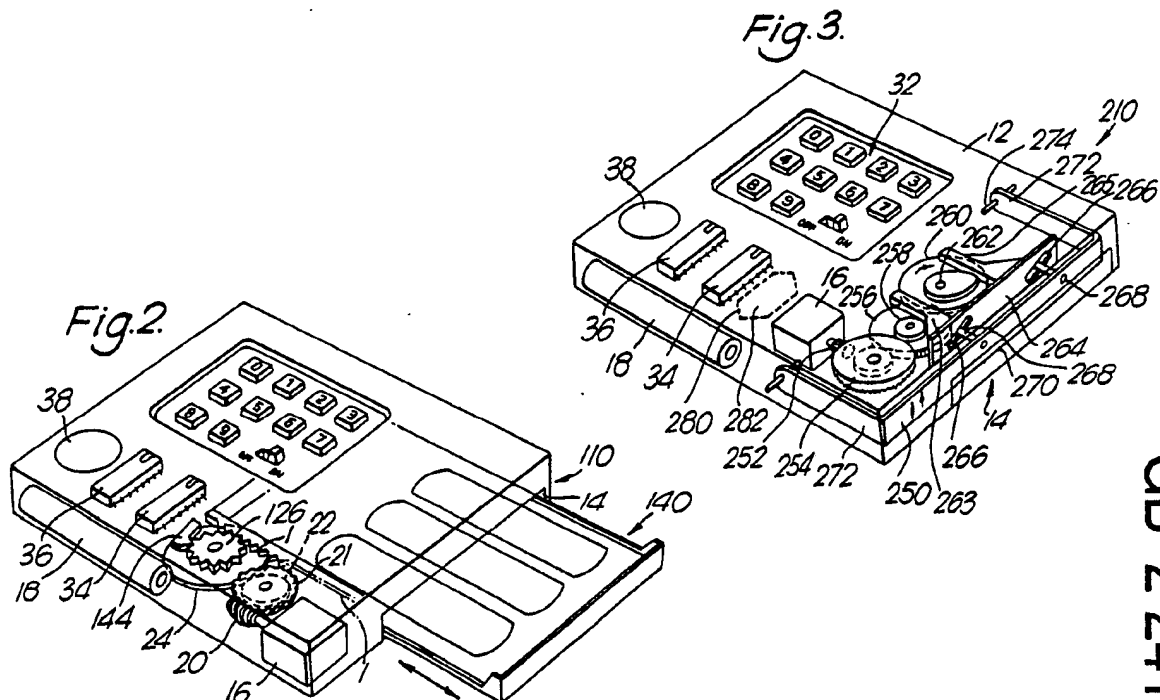
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(58) Field of search

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(54) Card holder

(57) A flat rectangular body (12) has a card holding cavity opening (14) in an edge face. Removal of cards (15) through the opening (14) is possible when a motor (16) is actuated by security command means, e.g. an electronic combination lock (32, 34). The actuated motor (16) may cause displacement of a barrier (250) or displacement of a drawer (140) or rotation of a drive wheel (26) that acts directly on stored cards. There may be frangible containers (280) of glue so that violence leads to cards being rendered unusable by being bonded to each other and parts of the body (12).



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Fig. 1.

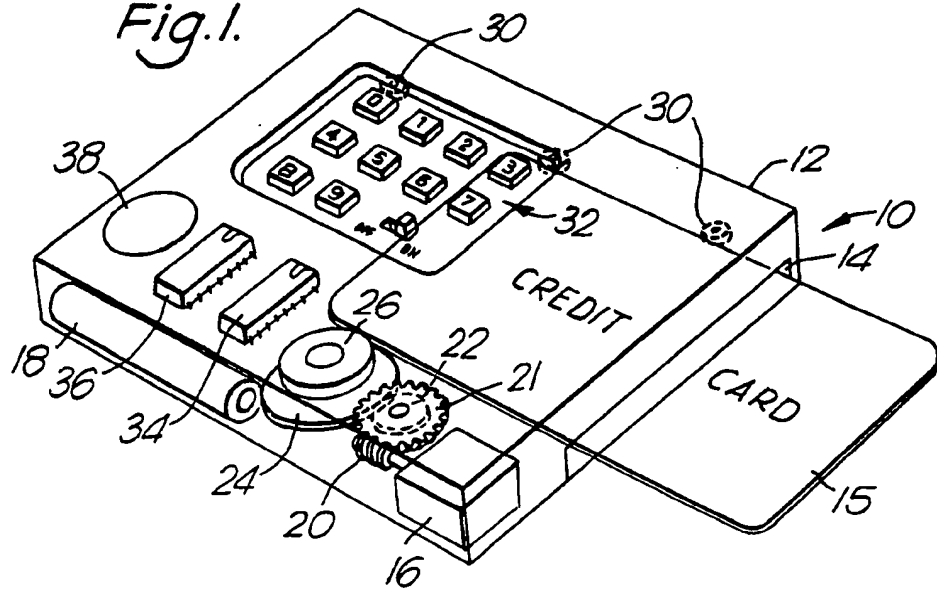


Fig. 2.

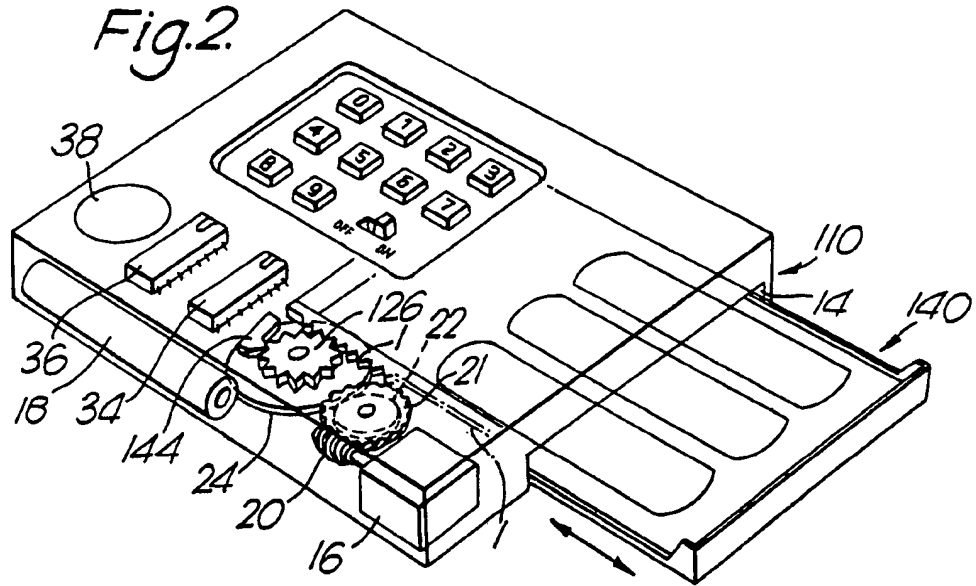
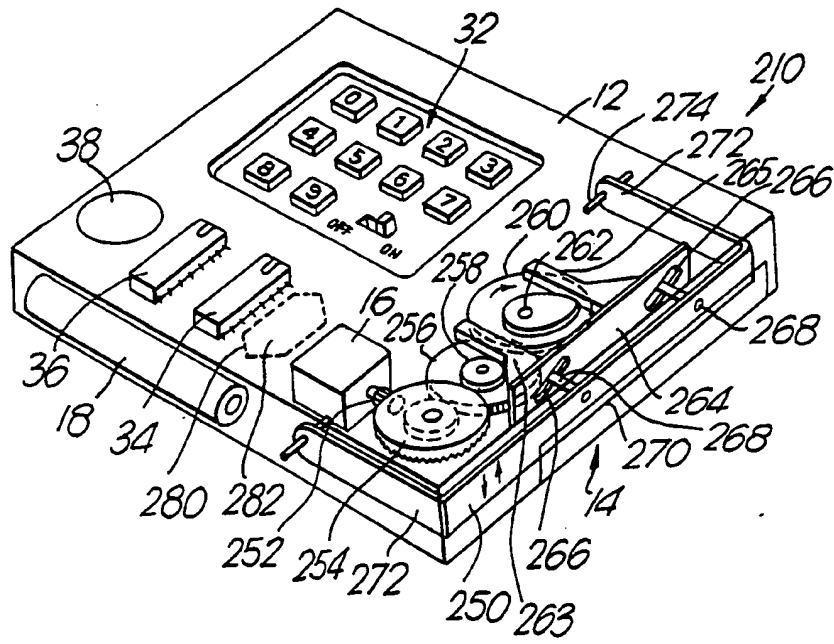


Fig. 3.



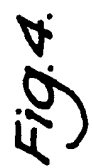
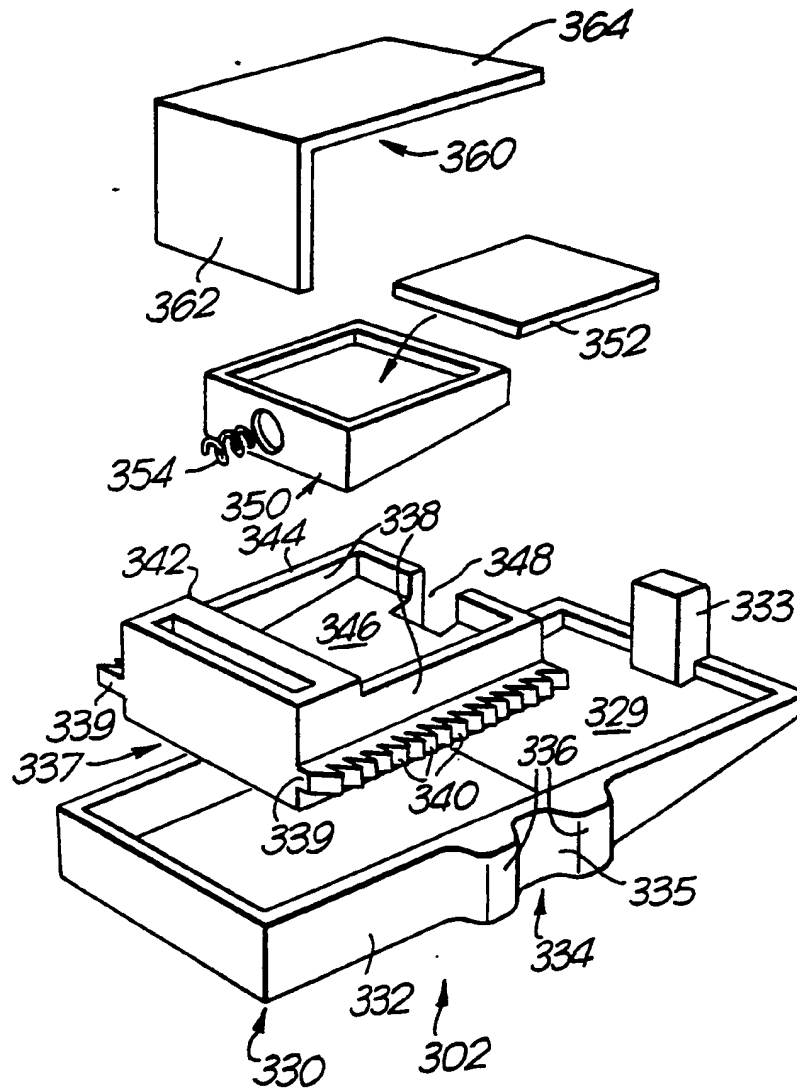
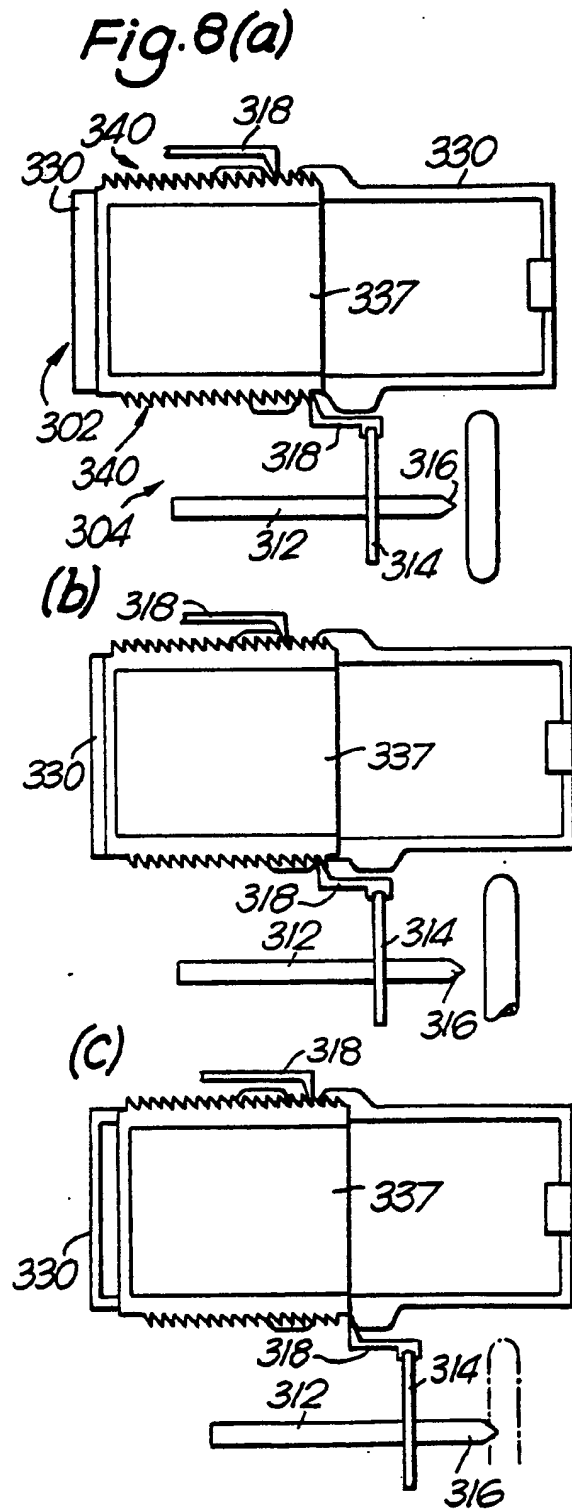
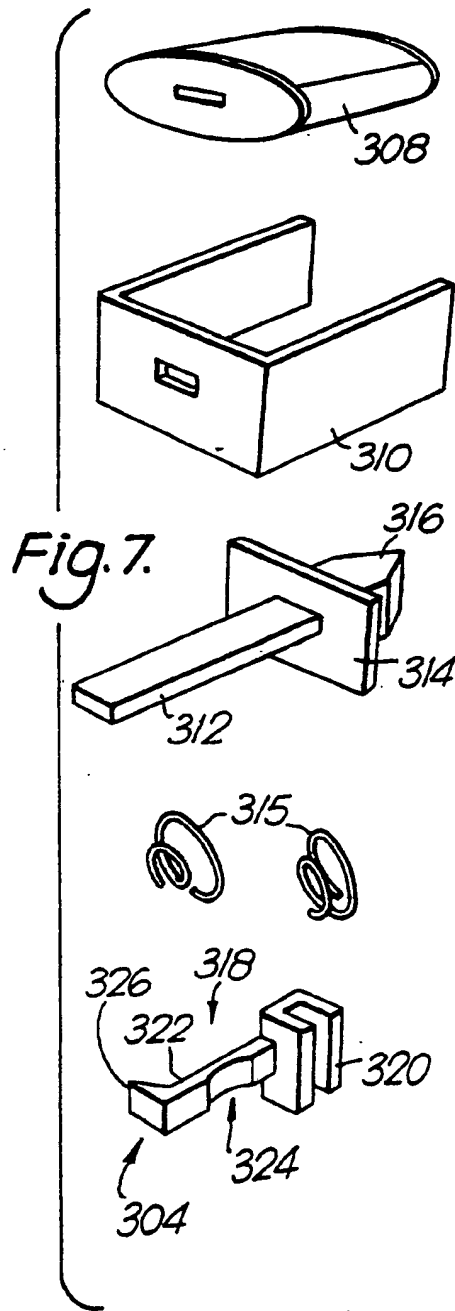


Fig. 6.





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CARD HOLDER

The present invention relates to a card holder, particularly for holding one or more credit cards or other important cards such as cheque guarantee cards and identity cards.

Many credit card holders are available, but these are merely varieties of wallet which, in a sense, make things easier for the thief by collecting all of a victim's cards together while affording no protection for them.

US4,202,445 Porter discloses a credit card holder having a body, a drawer for holding cards, a releasable latch for the drawer, and a mechanical lock for permitting or preventing release of the latch. The body also contains a defacing mechanism such that an attempt to force open the device causes cards contained in it to be marked with a dye or other defacing material.

Small mechanical locks are likely to be of low security. If violence is used and cards are defaced in the course of theft, they are still likely to be usable for many illicit purposes.

The present invention provides a card holder comprising a hollow body having a cavity for storing one or more cards opening at an access slot through which a card is insertable and removable, the arrangement being such that a card within the cavity is substantially

inaccessible; means being provided for rendering a stored card accessible, said means including electromechanical displacement means; displaceable means which are displaceable by the displacement means to render a card accessible; and control means for the displacement means including security command means whereby only an authorised user can actuate the means. The displacement means may act to displace a card from the cavity at least partly out via the access slot. Alternatively or additionally it may cause displacement of a barrier.

A card or cards within the holder may be retained in a drawer or tray which is displaceable. Alternatively, there may be displacement means arranged to act directly on the card or cards.

Alternatively or additionally there may be a displaceable barrier which obstructs the access slot and is displaceable to allow passage of a card through the slot.

The displacement means may be a conventional rotary electric motor, or other electrical device for urging displacement, e.g. comprising a solenoid coil and an attractable element which is urged towards the solenoid interior when the coil passes a current.

Desirably, if a rotary motor is used, it effects displacement via gearing, preferably including an arrangement such as a worm-wheel drive which makes it

difficult or impossible to force displacement by applying force to the card, drawer or door.

Desirably the security command means comprises an electronic lock, preferable incorporating a keyboard for keying in a security number. Keying in the correct number may lead to actuation of the displacement means. Desirably there is an alarm device which is triggered by keying in an incorrect number. This may sound until the correct number is entered or some other routine is followed. The alarm may also be triggered by attempts to force the holder.

There may be one or more rupturable containers of fluid within the holder, so that attempts to destroy or force open the container are likely to lead to release of the fluid. A suitable fluid is a glue, particularly a rapid-acting glue such as a cyanoacrylate adhesive ("Superglue"). The container(s) may be disposed so that the glue flows over the card(s) and bonds them to the holder, particularly if this comprises plastics.

A preferred embodiment has a solenoid and armature, means for causing repeated actuation of the solenoid to urge reciprocation of the armature; card engaging means; and mechanical coupling between the armature and the card engaging means, the arrangement being such that reciprocation of the armature tends to cause overall displacement of the card engaging means. Thus there may be ratchet and pawl means associated with the armature

and the card engaging means, so that as the armature reciprocates, in one direction of movement the pawl and ratchet engage to urge displacement, whereas in the other direction of movement the pawl tends to click over the ratchet. There may be two independent solenoid/armature assemblies for urging displacement in different directions. The card engaging means may be adapted to abut an inner edge of a card. It may be adapted to grip a card, desirably having jaws that automatically reduce gripping force as the engaging means is displaced to render a card accessible. Thus the displacement may cause a follower portion associated with a jaw to engage a cam surface.

Some embodiments of the invention will now be described with reference to the accompany drawing in which:-

Fig. 1 is a schematic perspective view of a first embodiment of the invention;

Fig. 2 is a view similar to Fig. 1 but showing a second embodiment that includes a drawer;

Fig. 3 is a view similar to Fig. 1 but showing an embodiment with a displaceable barrier;

Fig. 4 is a schematic horizontal section of a third embodiment employing solenoids;

Fig. 5 is a side view corresponding to Fig. 4;

Fig. 6 is an exploded view of the card clutch and slide mechanism of the third embodiment;

Fig. 7 is an exploded view of the card-accepting solenoid drive mechanism of the third embodiment; and

Figs. 8a, b and c are details of Fig. 4 in different configurations.

Fig. 1 shows a card holder 10 having a slim calculator-like body 12 having an access slot 14 in one edge face. This slot is dimensioned so that standard credit cards and the like can be passed into the interior of the holder. A card 15 within the holder, is inaccessible, being spaced from the mouth of the slot 14. The holder contains a motor 16 powered by a battery 18 under control of a combination lock, which will be described later. When the motor runs, it drives a worm-wheel 20 which turns a large gear wheel 21 which is coaxial with a small gear wheel 22, which meshes with a large gear wheel 24 which is rotationally fast with a rubber friction drive wheel 26, which is arranged to abut the long edge of a credit card 15. Idle rollers 30 are arranged to abut the opposite edge. (They may be displaceably mounted and resiliently urged inwardly to provide engagement with credit cards of a range of sizes.) Thus, when the motor runs, it causes the drive wheel 26 to run, and this drives a credit card (or bundle of credit cards) to be displaced through the slot 14.

The combination lock includes a keyboard 32 coupled to a combination lock integrated circuit 34. This circuit 34 receives data input through the keyboard 32.

When these constitute a predetermined access code the motor 16 is actuated to drive a credit card or cards out of the holder 10. The motor is also actuatable in the reverse direction, to cause a card or cards to be received in the holder 10. This may also require a special code to be typed, or there could be a single button for use in accepting cards since this is less likely to be a security operation. Also coupled to the combination lock circuit 34, is an alarm generating integrated circuit 36, which feeds an audio warning device 38. Thus if an incorrect number is keyed in via the keyboard 32, the combination lock circuit 34 triggers the alarm circuit 36 which causes an alarm to be generated. This may continue for a fixed time, or until the correct number is keyed in or some other data are fed in via the keyboard 32.

Fig. 2 shows a generally similar holder 110, and corresponding elements are given the same reference numerals. It differs in that there is a drawer 140 for carrying the credit card or cards. Instead of a rubber drive wheel 26 there is a ratchet wheel 126, which engages a rack 142 on the side of the drawer 140. There may also be a pawl 144 against the ratchet wheel 126, to control its rotation.

Fig. 3 shows a third embodiment 210, in which elements corresponding to those in Fig. 1 are given the same reference numbers. Thus there is a card-holding

cavity with an entrance slot 14, and removal of a stored card is possible after actuation of a motor 16 via a keyboard 32. However, the action of the motor 16 is to displace a barrier or door 250 so that a stored card can be tipped out (possibly urged by a spring, not shown). The motor 16 has a driven shaft bearing a pinion 252 which engages a crown wheel 254. This drives an intermediate wheel 256 and pinion 258 which drives a large gear wheel 260 bearing a cam 262. A plate 264 is displaceably mounted to the body 12 of the holder 210 adjacent the slot of 14. The plate 264 has a pair of arms 265 which extend rearwardly, one on each side of the cam 262, which is shaped so that rotation in either direction urges it against a respective one of the arms 265, whereby the plate 264 is selectively urgeable in opposite directions. (Continued rotation in one sense may cause successive displacement of the plate in alternate directions). The plate 264 is penetrated by parallel oblique slots 266. The door 250 bears pins 268 which project through the slots. Thus displacement of the plate in one direction causes the door 250 to be raised, the pins 268 riding up the lower edges of the slots. Displacement in the reverse direction urges the door 250 to descend and close the entrance slot 14. The door 250 has a front plate portion 270 for closing the slot 14, and a pair of arms 272 which extend rearwardly at the ends. Their ends are pivotally connected (via pins 274)

to sides of the body 12, so that the door can hinge.

The body 12 may be of plastics material, e.g. formed by injection moulding. By this technique bodies can easily be produced with colours and designs to suit a particular customer.

Also shown in Fig. 3 is a rupturable glass ampoule 280 containing Superglue 282. It is mounted (suitably on a printed circuit board) so that if it is ruptured (by an attempt to break open the holder), the glue will spill out and flow over cards and components within the holder. The glue rapidly bonds or attacks many plastics, and thus the cards and plastics components of the holder (e.g. the body 12 and components and/or a printed circuit board of the electronic circuitry) are fused together, rendering the cards unusable.

The third embodiment, shown in Figs. 4-7, uses much of the same technology as the previous embodiments, including a combination lock having a keyboard 32 coupled to a combination lock integrated circuit, for actuating drive means. However, the drive means are different. As shown in Figs. 4 and 5, the plastic body 12 is rectangular in plan, and slightly larger than a card 15, which is fully receivable in a cavity which opens at a slot 14. The rear of the body 12, remote from the slot 14, is of increased thickness to accommodate the drive means 300. In the centre there is a card clutch and slide mechanism 302, and this is flanked by card-

accepting and card ejecting solenoid drive mechanisms 304, 306.

Each solenoid drive mechanism 304, 306 has a solenoid coil 308, of elliptical section to reduce thickness. This is partly embraced by a U-shaped pole piece 310. An armature 312 projects from the unshielded end of the coil, and is displaceable in and out. It carries a transverse pole plate 314. A pair of springs 315 resiliently urge it to a configuration in which the plate 314 is spaced from the coil and displaceable in either sense. In the case of the card-accepting drive mechanism 304, the armature extends forwardly and is continued beyond the plate 314 by a pointed nose 316. The card ejecting drive 306 is oriented the other way round. Each plate 314 carries a driving pawl member 318, which has an engagement piece 320 from which an arm 322 extends, parallel to the armature. The arm 322 of the ejecting drive 306 is longer than that of the accepting drive 304. Both arms 322 have some flexibility, e.g. due to a thinned portion 324. Each has a toothed head 326.

The card clutch and slide mechanism 302 has a fixed frame 330 which is generally rectangular in plan, with a floor 329 that slopes upwardly at the front to follow the outline of the body 12. A rectangular peripheral wall 332 has, in the middle at the front, an upstanding pillar 333 that projects rearwardly within the frame. The side wall portions have outward projections which extend for

the height of the wall (though this is not essential) and constitute drive release ramps 334. In horizontal section, each provides a central recess 335 flanked by a pair of protrusions 336 that provide camming surfaces. At the side adjacent the eject card drive 306, the recess 335 is relatively short.

A slider carriage 337 has the form of a rectangular box. The two side walls 338 have projecting ribs 339 with rack teeth 340, facing different ways at the different sides. The carriage is dimensioned so it can sit partly within the frame, with the ribs resting slidably on the sides of the wall 332. The heads 326 of the panels 318 each engage rack teeth 340 with their upper portions. Lower portions extend below the ribs 339, so as to be engageable with the drive release ramps 336. At the rear, the carriage has means 342 defining a vertical slot. Forwardly of this there is a tray portion 344 with a base 346 that rises forwardly. A central slot 348 penetrates the front portion of the tray.

A clutch member 350 is a tray of tapering form, dimensioned to fit in the tray portion 344 with its upper tray surface horizontal and with room for forward movement. It receives and retains a friction pad 352, e.g. of rubber or other resilient material, which stands proud of the clutch member 350. At the rear, the clutch member carries a compression spring 354 which abuts the wall of the slot means 342, so that the clutch member is

urged forwardly. When the carrier 337 is pushed forwardly on the frame 330, the slot 348 accommodates the projecting pillar 333. This pushes the clutch member 350 rearwardly, compressing the spring 354.

A card clamp plate 360 is an L-shaped plate having a mounting arm 362 that passes slidably into the slot defined (342) in the carriage. The other arm 364 overlies the pad 352. Together they constitute card clutching jaws.

Fig 4 shows a card 15 fully received in the device, its front edge space inwardly of the access slot 14. Its rear edge portion is centrally engaged by the jaws 364, 352; and the carriage 337 (bearing the clutch member 350) is at its rearmost position. (See also Fig. 8(a).) To retrieve the card, the drive means must be actuated via the keyboard 32. This causes the solenoid 308 of the card accepting drive 304 to be energised continuously. The pawl head travels up the camming surface provided by a protrusion 336 of a drive release ramp, and is thus disengaged from the rack teeth 340, as shown in Fig. 8(b). A series of pulses is fed to the solenoid 308 of the card ejecting drive 306. Thus the associated armature 312 and pawl 318 are reciprocated. The interaction of the pawl with the rack teeth 340 of the adjacent rib 338 causes the carriage 334 to move in steps towards the access slot 14. When the carriage 337 reaches the front of the frame, the pillar 333 pushes the clutch member 350 rearwardly. The complementary tapers

of the surfaces of the clutch member and tray base 346 cause the clutch member to descend, tending to lower the pad 352 from the card. Thus the card is moved so that it projects through the access slot 14 and can be removed. To store a card, the process is substantially reversed. The card is passed in through the access slot until it abuts the follower arm 362 of the clamp plate and thus lies between the spaced-apart faces 352, 364. The card accepting solenoid 304 is then fed a series of pulses, causing the carriage 334 to be driven rearwardly. The pawl of the eject drive is disengaged from its rack by its drive release ramp. The card is gripped by the jaws and carried rearwardly.

An attempt to pull the card out improperly will cause the rack teeth 340 and pawl head 326 of the accept card drive mechanism 304 to lock, so that the armature 312 is pulled forwardly and its pointed nose 316 contacts and ruptures a glass vial 360 of glue that is mounted in the plastic body (Fig.8(c)). The glue will spread over the card and the body interior, and fuse them together.

The device has two power sources: a lithium cell 362 for the keyboard and circuitry; and heavier duty cells 364 for the solenoids. Desirably there is a sounder 366 triggered by misuse of the keyboard. It may be arranged that, once actuated, this is driven constantly by the heavier duty cells 364, until it is cancelled by a routine known only to an authorised user, or the cells are exhausted. In the latter case, the flatness of the

batteries will disclose to the user that there has been misuse of his device.

CLAIMS

1. A card holder comprising:

a hollow body having a cavity for storing one or more cards opening at an access slot through which a card is insertable and removable, the arrangement being such that a card within the cavity is substantially inaccessible;

means for rendering a stored card accessible, said means including electromechanical displacement means; displaceable means which are displaceable by the displacement means to render a card accessible; and control means for the displacement means including security command means whereby only an authorised user can actuate the displacement means.

2. A card holder according to claim 1 wherein said security command means comprises a keyboard, combination lock integrated circuit means coupled to the keyboard to receive input data from it and arranged to detect when said data constitute a predetermined access code and provide an enabling output signal in response thereto; the card holder including means for actuating said displacement means in response to said enabling output signal.

3. A card holder according to claim 2 including alarm means coupled to said combination lock integrated circuit means; said combination lock integrated circuit means being adapted to actuate said alarm means when incorrect data are received from the keyboard.

4. A card holder according to any preceding claim wherein said displacement means comprise a rotary electric motor which is coupled to said displaceable means via gearing which resists displacement of said displaceable means by force applied to said displaceable means otherwise than via said gearing.

5. A card holder according to any of claims 1-3 wherein said displacement means comprises a solenoid.

6. A card holder according to claim 5 including a solenoid and armature, means for causing repeated actuation of the solenoid to urge reciprocation of the armature; card engaging means; and mechanical coupling between the armature and the card engaging means, the arrangement being such that reciprocation of the armature tends to cause overall displacement of the card engaging means.

7. A card holder according to claim 6 having two solenoids and armatures respectively coupled to the card engaging means so as to be actuatable to displace it in opposite senses.

8. A card holder according to any preceding claim including a frangible container of glue mounted adjacent the cavity so that after fracture the glue will tend to run over a card if present in the cavity.

9. A card holder according to any preceding claim wherein said hollow body has an internal edge portion extending perpendicularly to the access slot to define a longitudinal edge of the cavity; and wherein said

displaceable means comprises one or more drive wheels rotatably mounted adjacent said longitudinal edge of the cavity for engaging a longitudinal edge of a card; said one or more drive wheels being rotatable by said displacement means to urge a stored card through said access slot.

10. A card holder according to any of claims 1-8 wherein said displaceable means comprises a card carrier drawer mounted to said body so as to be displaceable via said access slot from a storing configuration in which it is substantially within said cavity to an access configuration in which it is substantially outside said body and cards can be placed in it and removed from it.

11. A card holder according to any preceding claim wherein said displaceable means comprises a barrier displaceable between a blocking configuration in which it obstructs said access slot and an access configuration in which passage of a card through said slot is possible.

12. A card holder according to claim 11 wherein said displaceable means comprises a cam member mounted to said body so as to be displaceable in the longitudinal direction of said access slot, said cam member having an oblique cam surface; and wherein said barrier is displaceable in the transverse direction of said access slot and includes follower means for following said oblique cam surface, such that said longitudinal displacement of said cam member urges said transverse displacement of said barrier.

13. A card holder substantially as herein described with reference to and as illustrated in the accompanying drawings.

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